# MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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## INTRODUCTION.

The MONTHLY WEATHER REVIEW for June, 1901, is based on reports from about 3,100 stations furnished by employees and voluntary observers, classified as follows: regular stations of the Weather Bureau, 159; West Indian service stations, 13; special river stations, 132; special rainfall stations, 48; voluntary observers of the Weather Bureau, 2,562; Army post hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Railway Company, 96; Hawaiian Government Survey, 200; Canadian Meteorological Service, 32; Jamaica Weather Office, 160; Mexican Telegraph Service, 20; Mexican voluntary stations, 7; Mexican Telegraph Company, 3; Costa Rica Service, 7. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Hawaiian Government Survey, Honolulu; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; Commander Chapman C. Todd, Hydrographer, United States Navy; H. Pittier, Director of the Physico-Geographic Institute, San Jose, Costa Rica; Captain François S. Chaves, Director of the Meteorological Observatory, Ponta Delgada, St. Michaels, Azores, and W. M. Shaw, Esq., Secretary, Meteorological Office, London; Rev. Josef Algué, S. J., Director, Phillipine Weather Service.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is 157° 30′, or $10^h\ 30^m$ west of Greenwich. The Costa Rican standard of time is that of San Jose, $0^h\ 36^m\ 13^s$ slower than seventy-fifth meridian time, corresponding to $5^h\ 36^m$ west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

Barometric pressures, whether "station pressures" or "sea-level pressures," are now always reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

## FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

No general storms which required special forecasts or warnings occurred within the region of observation during June, 1901. Forecasts of the direction and force of the wind and the state of the weather along the transatlantic steamship routes from the American coast to the Banks of Newfoundland were issued daily at 8 a. m. and 8 p. m. These forecasts covered the first three days out of steamers bound east from United States ports, and the morning forecasts were published, together with forecasts of fog, in the weather maps issued at Boston, New York, Philadelphia, Baltimore, and Washington.

Frosts occurred in the Northwestern States, and from the northern Rocky Mountain districts over the North Pacific coast States in the early part of the month. Warnings were issued well in advance of the frost which occurred in the northwestern districts.

Drought which prevailed early in the month in the spring wheat States of the Northwest was broken by rains, the occurrence of which was covered by timely forecasts.

Heavy rains and destructive freshets occurred in the mountain districts of Virginia about the 17th, and on the 21st freshets caused loss of life and property in West Virginia.

Snow flurries were reported at Lagrande, Oreg., and in northern Vermont on the 4th. From the 11th to the 13th a depth of 4 inches or more of snow was reported in the hills about Antelope, Oreg, and on the 14th snow fell at Laramie, Wyo.

### CHICAGO FORECAST DISTRICT.

One of the principal features was the breaking of the drought in the spring wheat States in the northwest early in the month. The rain came at a most opportune time, as, otherwise, great damage would have been done. The forecasts for rain in that section were timely and influenced the price of wheat on the board of trade. Warnings were sent out on the 6th and 7th in advance of the frosts which occurred in the Northwestern States. The only storm that caused general high winds in the upper Lake region occurred on the 28th and 29th, and warnings were issued in ample time to advise all vessel interests.—*H. J. Cox, Professor.*

### SAN FRANCISCO FORECAST DISTRICT.

No severe storms occurred, and there were no northers in the great valleys to injure crops. On the morning of the 4th

light frosts occurred in the northern part of the State, and the same condition occurred about a week later. Toward the close of the month high temperatures were reported in the great valleys of California, but, with the exception of the morning of the 30th, the winds were not particularly high.—*A. G. McAdie, Professor.*

### PORTLAND, OREG., FORECAST DISTRICT.

The month in the North Pacific States was unseasonably cool, and frosts frequently occurred in eastern Oregon and southern Idaho which did great damage to fruit and gardens. Most of the frosts were forecast, but some occurred without warnings, due to its being impossible to accurately foretell the irregular movements taken by abnormal high pressure areas.

The annual flood crest in the Columbia River passed Portland on the 3d, with a steerage of 20.8 feet. The river remained nearly on a stand for five days, and then slowly fell, passing below the danger line of 15 feet on the 20th. Forecasts of the daily stages for three days in advance for both Portland and The Dalles were made from the 1st until the 15th, when the announcement was made that the river would continue to fall at the rate of about three-tenths (0.3) of a foot a day during the next three days.—*E. A. Beals, Forecast Official.*

### HAVANA, CUBA, FORECAST DISTRICT.

No general storm occurred in the West Indies during the month. During the second and third weeks excessive rains occurred over the greater part of Cuba, flooding lowlands, causing rivers to overflow, inundating contiguous lands, washing away crops, houses, stock, etc., and causing the loss of a few lives.—*W. B. Stockman, Forecast Official.*

### RIVERS AND FLOODS.

The Missouri River, as is usual during the month of June, rose somewhat, but not to any unusual heights, no danger-line stages having been reported. The Missouri rise also caused a rise in the Mississippi River from Alton, Ill., to the mouth of the Ohio River. Above Alton, and below Cairo, Ill., the average stages were considerably lower than during May, 1901.

Over the Ohio watershed the rains were sufficiently timely and abundant to provide excellent navigable stages of water, averaging over 20 feet below the mouth of the Great Kanawha River. There was a moderate flood in the Great Kanawha on the 24th, the stage at Charleston, W. Va., reaching 30.9 feet, 0.9 foot above the danger line. This flood contributed an additional 10 feet to the Ohio below Point Pleasant, W. Va.

The James River and the rivers of South Carolina were high at times, and in several of the latter the danger lines were exceeded by several feet. Timely and accurate warnings of these floods were given. In the James River the danger lines were not quite reached, but in the vicinity of Richmond, Va., some inconvenience was caused in the lower portions of the city. The losses, however, were trifling, as the warnings were well heeded.

The highest and lowest water, mean stage, and monthly range at 137 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport on the Red.—*H. C. Frankenfield, Forecast Official*

### AREAS OF HIGH AND LOW PRESSURE.

*Movements of centers of areas of high and low pressure.*

| Number. | First observed. | | | Last observed. | | | Path. | | Average velocities. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Date. | Lat. N. | Long. W. | Date. | Lat. N. | Long. W. | Length. | Duration. | Daily. | Hourly. |
| High areas. | | ° | ° | | ° | ° | *Miles.* | *Days.* | *Miles.* | *Miles.* |
| I | 5, a.m. | 53 | 109 | 11, p.m. | 32 | 65 | 3,150 | 6.5 | 485 | 20.2 |
| II | 10, a.m. | 54 | 114 | 13, p.m. | 42 | 70 | 2,550 | 3.5 | 728 | 30.3 |
| III | 12, a.m. | 54 | 114 | 15, p.m. | 48 | 68 | 2,000 | 3.5 | 571 | 23.8 |
| IV | 16, a.m. | 37 | 105 | 19, p.m. | 40 | 75 | 2,000 | 3.0 | 667 | 27.8 |
| Sums | | | | | | | 9,700 | 16.5 | 2,451 | 102.1 |
| Mean of 4 paths | | | | | | | 2,425 | | 608 | 25.5 |
| Mean of 16.5 days | | | | | | | | | 588 | 24.5 |
| Low areas. | | | | | | | | | | |
| I | 1, p.m. | 42 | 90 | 4, p.m. | 46 | 60 | 1,780 | 3.0 | 593 | 24.7 |
| II | 1, p.m. | 51 | 104 | 2, p.m. | 38 | 97 | 800 | 1.0 | 800 | 33.3 |
| III | 3, a.m. | 51 | 120 | 10, a.m. | 49 | 64 | 3,500 | 7.0 | 500 | 20.8 |
| IV | 11, a.m. | 37 | 105 | 13, a.m. | 48 | 89 | 1,500 | 2.0 | 750 | 31.2 |
| V | 12, a.m. | 23 | 82 | 14, a.m. | 32 | 86 | 900 | 2.0 | 450 | 18.8 |
| VI | 13, a.m. | 44 | 104 | 18, a.m | 43 | 79 | 2,650 | 5.0 | 530 | 22.1 |
| VII | 16, a.m. | 33 | 84 | 18, p.m. | 35 | 76 | 525 | 2.5 | 210 | 8.8 |
| VIII | 22, a.m. | 44 | 88 | 24, a.m. | 44 | 71 | 995 | 2.0 | 462 | 19.2 |
| IX | 24, a.m. | 51 | 114 | 25, p.m. | 50 | 97 | 820 | 1.5 | 547 | 22.8 |
| X | 27, p.m. | 38 | 105 | 30, a.m. | 48 | 68 | 2,100 | 2.5 | 840 | 35.0 |
| XI | 29, p.m. | 41 | 109 | *1, p.m. | 47 | 84 | 1,350 | 2.0 | 675 | 28.1 |
| Sums | | | | | | | 16,850 | 30.5 | 6,357 | 264.8 |
| Mean of 11 tracks | | | | | | | 1,532 | | 578 | 24.1 |
| Mean of 30.5 days | | | | | | | | | 552 | 23.0 |

*July.

*Geo. E. Hunt, Chief Clerk Forecast Division.*

## CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following summaries relating to the general weather and crop conditions are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau.

[Temperature is expressed in degrees Fahrenheit and precipitation in inches and hundredths.]

*Alabama.*—The mean temperature was 78.5°, or 0.3° above normal; the highest was 103°, at Livingston on the 27th, and the lowest, 48°, at Riverton on the 1st. The average precipitation was 2.80, or 1.90 below normal; the greatest monthly amount, 5.88, occurred at Camp Hill, and the least, 0.46, at Marion.

Wind and hailstorms in central and northern counties during first half of month caused considerable local damage to crops; otherwise, conditions moderately favorable for farm work and crop growth.—*F. P. Chaffee.*

*Arizona.*—The mean temperature was 77.3°, or 3.8° below normal; the highest was 123°, at Mohawk Summit on the 28th, and the lowest, 30°, at Flagstaff on the 11th, 14th, and 15th. The average precipitation was 0.01, or 0.24 below normal; the greatest monthly amount, 0.34, occurred at Supai, while none fell at a great number of stations.

Generally favorable conditions for the development of crops obtained during the first part of the month, and the harvesting of wheat was in active progress in the lower agricultural valleys during the second de-